

Application Number 10/650,121  
Response to Final Office Action mailed February 7, 2008

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**REMARKS**

This communication is responsive to the Final Office Action dated February 7, 2008. Applicant has made no amendments to the claims by way of this communication. Claims 1-57 remain pending.

**Claim Rejections Under 35 U.S.C. § 103**

In the Final Office Action, the Examiner rejected claims 1-5, 7-20, 22-35, 37-45, 55 and 56 under 35 U.S.C. § 103(a) as being unpatentable over "*A Newton Method for Linear Programming*" by O. L. Mangasarian, Data Mining Institute Technical Report 02-02, March 2002, (hereinafter "Mangasarian") in view of "*Data Selection for Support Vector Machine Classifiers*", by Glenn Fung et al., Data Mining Institute Technical Report 00-02, February 2000, (hereinafter "Fung") and further in view of "*Multiple Centrality Corrections in a Primal-Dual Method for Linear Programming*", Jacek Gondzio (hereinafter "Gondzio"). The Examiner also rejected claims 6, 21, 36, 46-54 and 57 under 35 U.S.C. § 103(a) as being unpatentable over Mangasarian in view of Fung, and in view of "*Finite Newton Method for Lagrangian Support Vector Machine Classification*", by Glen Fung et al., Data Mining Institute Technical Report 02-01, February 2002, (hereinafter Fung2) and further in view of Gondzio. Applicant respectfully traverses the rejections. The applied references fail to disclose or suggest the inventions defined by Applicant's claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

Applicant's independent claim 1 is directed to a computer-implemented method that comprises defining a primal linear programming formulation of a support vector machine classifier, solving an exterior penalty function of a dual of the primal linear programming formulation to produce a solution to the primal linear programming formulation of the support vector machine classifier, and selecting an input set for the support vector machine classifier based on the solution.

In support of the rejection of Applicant's claim 1, the Examiner characterized page 13, lines 1-3 and page 3, paragraph 2 of Mangasarian as disclosing defining a linear programming formulation of a support vector machine classifier. The Office Action further characterized page 3, paragraph 2 and page 4, lines 1-8 as disclosing solving an exterior penalty function of a dual of

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the linear programming formulation to produce a solution to the support vector machine classifier. The Examiner indicated that Mangasarian fails to teach selecting an input set for the support vector machine classifier, and characterized Fung as satisfying this shortcoming. The Examiner also indicated that neither Mangasarian nor Fung teaches a primal linear programming formulation, and characterized Gondzio as satisfying this shortcoming of Mangasarian and Fung. Applicant respectfully disagrees with the Examiner's characterization of the references and the application of the references to the Applicant's claims.

As described in Applicant's Amendment dated November 26, 2007, Mangasarian discloses a Newton method for solving linear programs.<sup>1</sup> Page 3, paragraph 2 of Mangasarian describes solving an exterior penalty function of a primal linear program to produce an exact solution to the dual of the linear program, not a solution to the original primal linear program. In particular, Mangasarian describes beginning with a primal linear program, defining an exterior penalty formulation for the primal linear program, and solving the penalty function for a solution to the dual of the primal linear program.<sup>2</sup> The Examiner's characterization of Mangasarian as not disclosing a primal linear programming formulation is erroneous and the Examiner's reliance on Gondzio's completely different interior point method as disclosing a primal linear programming formulation irrelevant. Regardless, Applicant points out a number of differences between the applied references and Applicant's claim 1.

Mangasarian, alone or in combination with Fung, Gondzio or any other reference on record, fails to teach or suggest solving an exterior penalty function of the dual of the primal linear program to produce a solution to the primal linear programming formulation, as required by Applicant's claim 1. To the contrary, Mangasarian solves an exterior penalty function of the primal linear program instead of the dual. As a result, Mangasarian obtains a solution of the dual linear program instead of obtaining a solution to the primal linear program, as required by Applicant's claim 1.

Fung fails to cure any of the deficiencies identified above with respect to Mangasarian. Fung fails to describe solving an exterior penalty function on the primal or dual linear programming formulation. In fact, Fung fails to describe solving a penalty function at all.

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<sup>1</sup> Mangasarian, Abstract.

<sup>2</sup> Mangasarian, page 3, paragraph 2.

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Likewise, Gondzio also fails to cure any of the deficiencies identified above with respect to Mangasarian and Fung. Gondzio describes solving a primal-dual interior penalty function.<sup>3</sup> Applicant's claim 1 specifically recites solving an exterior penalty function of the dual, which is totally different than an interior penalty function. Moreover, the techniques described in Gondzio are used to solve a combined primal-dual interior penalty method, whereas Applicant's claim 1 recites solving the exterior penalty function of only the dual linear program. As such, modifying the teachings of Mangasarian with the teachings of Fung and Gondzio would not result in solving an exterior penalty function of the dual of the primal linear program to produce a solution to the primal linear programming formulation, as required by Applicant's claim 1 as amended.

Applicant's independent claim 16 is directed to a classification system and requires a processor that applies a primal linear programming formulation of a support vector machine classifier to classify data based on an input set and an input module that generates the input set based on a solution of an exterior penalty function of a dual of the primal linear programming formulation.

Applicant's independent claim 31 is directed to a computer-readable medium comprising instructions to cause a processor to define a primal linear programming formulation of a support vector machine classifier solve an exterior penalty function of a dual of the primal linear programming formulation to produce a solution to the primal linear programming formulation of the support vector machine classifier and select an input set for the support vector machine classifier based on the solution.

Applicant's independent claim 55 is directed to a support vector machine classification system that includes a data storage medium storing input data for classification, a support vector machine classifier that classifies the input data into a first set of data and a second set of data based on a set of input features and a selection module that produces a reduced set of input features for the support vector machine classifier based on a minimization of an exterior penalty function of a dual of a primal linear programming formulation of the linear support vector machine classifier for a finite value of a penalty parameter.

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<sup>3</sup> Gondzio, Abstract.

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For the reasons set forth above with respect to claim 1, Mangasarian in view of Fung in further view of Gondzio fails to teach or suggest at least some of the requirements of Applicant's independent claims 16, 31 and 55. In view of the deficiencies of Mangasarian, Fung and Gondzio, Applicant reserves comment regarding the application of the references to the dependent claims. Applicant does not, however, acquiesce in the Office Action's interpretation of Applicant's dependent claims or the application of the references to the Applicant's dependent claims. For at least these reasons, the Examiner has failed to establish a prima facie case for non-patentability of Applicant's claims 1-57 under 35 U.S.C. § 103(a). Applicant respectfully requests withdrawal of these rejections.


### CONCLUSION

In the foregoing remarks, Applicant has focused on the requirements of the independent claims for purposes of conciseness. In so doing, Applicant in no way admits or acquiesces in the propriety of the Office Action in regard to interpretation of the prior art or any of the additional limitations set forth in the various claims, including the limitations of the dependent claims. All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date:

April 4, 2008  
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